UCRL-JC-124267 Abs

TETRAHEDRAL HOHLRAUMS ON THE NIF

J.D. Schnittman (a) and S.M. Pollaine
Lawrence Livermore National Laboratory
Livermore, California 94550

(a) - Also University of Rochester, Laboratory for Laser Energetics,
Rochester, NY 14623

poster presentation preferred

Spherical hohlraums with four laser entrance holes (LEH's) arranged in a tetrahedral geometry promise an alternative approach to designing indirect drive targets for the National Ignition Facility (NIF). With the current target chamber design, a tetrahedral hohlraum could be illuminated by 44 of the 48 NIF laser beams with radiation temperatures of 300 eV and high radiation uniformity throughout the laser pulse. The symmetry on the capsule has been evaluated in terms of spherical-harmonic modes, including in particular the higher modes which are more likely to lead to Raleigh-Taylor instability.

The principal issues to be considered in designing a tetrahedral hohlraum include clearances between the laser beams and the LEH's and the fuel capsule. By varying the locations of the LEH's on the sphere with respect to the target chamber, the trade-off between the minimum and maximum clearance angles has been analyzed. The effect of laser refraction caused by ablating plasma within the hohlraum has also been investigated. A robustness study has been carried out to look at the effects on uniformity of inexact beam pointing and variations in laser beam energies (up to 8%). Using realistic numbers, sufficient radiation uniformity should still be achieved. A detailed NIF design for tetrahedral hohlraums is propostemperatures and good uniformity for the duration of the laser pulse.

This work was partially supported by the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement No. DE-FC03-92SF19460, the University of Rochester, and the New York State Energy Research and Development Authority. The support of the DOE does not constitute an endorsement by DOE of the views expressed in this article. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.